

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. - 14. (canceled).

15. (currently amended): A power supply device for electric discharge machining comprising:

a switching ~~circuit~~ unit that supplies a discharge pulse current to an inter- electrode portion between an electrode and a workpiece serving as another electrode arranged to be opposed to the electrode at a predetermined interval; and

a pulse width control unit that generates a control pulse signal of a predetermined pulse width in response to a detection signal for starting a discharge in the inter-electrode portion,

wherein the switching ~~unit circuit~~ comprises ~~includes~~

a first switching circuit ~~comprising including~~ a first switching element suitable for a high-speed operation that performs a switching operation according to a first drive pulse signal generated in response to the control pulse signal; and

a second switching circuit ~~comprising including~~ a second switching element suitable for a low-speed operation that performs ~~the~~ a switching operation with an overlapping period after operation start of the first switching circuit according to a second drive pulse signal generated in response to the control pulse signal, and

wherein the first switching circuit and the second switching circuit receive the control pulse signal in parallel.

16. (currently amended): The power supply device for electric discharge machining according to claim 15, wherein ~~the switching circuit includes~~

~~a the~~ first switching circuit ~~including further comprises any at least one of the switching~~ element suitable for the high-speed operation that perform ~~the a~~ switching operation according to ~~a the~~ first drive pulse signal generated in response to the detection signal for starting the discharge and the second switching element suitable for the low-speed operation; and

~~a the~~ second switching circuit ~~including further comprises the second~~ switching element suitable for the low-speed operation that performs ~~a the~~ switching operation overlapped with an operation time of the first switching circuit according to the second drive pulse signal generated in response to the control pulse signal.

17. (currently amended): The power supply device for electric discharge machining according to claim 16, wherein the pulse-width control unit ~~includes comprises:~~

a first setting unit that generates the control pulse signal that is set to a first pulse width giving a period in which one of the opposed switching elements comes into a conductive state, and gives the control pulse signal to a drive unit of the one of the opposed switching elements; and

a second setting unit that generates the control pulse signal that is set to a second pulse width giving a period in which other of the opposed switching elements comes into a conductive state, and gives the control pulse signal to a drive unit of the other of the opposed switching elements.

18. (currently amended): The power supply device for electric discharge machining according to claim 16, wherein the pulse-width control unit ~~comprises;~~includes

a setting unit that generates the control pulse signal that is set to a first pulse width;

an extension unit that extends the first pulse width to produce a second pulse width, and outputs the control pulse signal of the second pulse width; and

a control pulse switching unit that switches the control pulse signal having the first pulse width and the control pulse signal having the second pulse width, and outputs the control signal to a drive unit, which drives the opposed switching elements according to an instruction, ~~from outside as wherein the~~ a control pulse signal ~~having~~has a pulse width that brings the respective switching elements into a conductive state.

19. (currently amended): The power supply device for electric discharge machining according to claim 15, wherein

the switching unit further comprises~~is~~the circuit includes

a ~~the~~ first switching circuit ~~including comprising~~ the first switching element suitable for the high-speed operation that performs a ~~the~~ switching operation according to a drive pulse signal generated in response to the detection signal for starting the discharge; and

a ~~the~~ second switching circuit ~~including comprising~~ the second switching element suitable for the low-speed operation that are controlled to perform a ~~the~~ switching operation overlapped with an operation time of the first switching circuit after the switching operation of the first switching circuit is started, and

wherein the pulse width control unit controls the pulse width of the control pulse signal to be different from each other between ~~the~~ switching elements opposed to each other in the second switching circuit.

20. (currently amended): The power supply device for electric discharge machining according to claim 16, wherein:

the pulse-width control unit ~~comprises~~ includes

a first setting unit that generates the control pulse signal that is set to a first pulse width;

an extension unit that extends the first pulse width to produce a second pulse width, and outputs the control pulse signal of the second pulse width;

a pulse-width switching unit that switches the control pulse signal having the first pulse width and the control pulse signal having the second pulse width, and outputs the control signal to a drive unit, which drives ~~the~~ opposed switching elements according to an instruction,

~~wherein from outside as a~~ the control pulse signal ~~having has~~ a pulse width that brings the respective switching elements into a conductive state; and

a second setting unit that sets a pulse width giving a period in which the respective switching elements opposed to each other in the first switching circuit are brought into a conductive state, and

the drive ~~units-unit~~ that drives the respective switching elements opposed to each other in the first switching circuit receives the detection signal for starting the discharge, and generate a drive pulse signal having the pulse width set by the second setting unit to drive the respective switching elements.

21. (currently amended): The power supply device for electric discharge machining according to claim 15, further comprising a ~~pulse-width pulse-width~~ setting unit that performs setting for changing a pulse width of the control pulse signal before starting the discharge ~~from outside~~.

22. (currently amended): A power supply device for electric discharge machining comprising:

a switching ~~circuit-unit~~ that supplies a discharge pulse current to an inter-electrode portion that is a portion between an electrode and a workpiece serving as another electrode arranged to be opposed to the electrode at a predetermined interval; and

a pulse-width control unit that generates a control pulse signal of a predetermined pulse width in response to a detection signal for starting a discharge at the inter-electrode portion, wherein

the switching ~~unit circuit comprises~~ includes

a ~~first switching circuit including comprising~~ a first switching element suitable for a high-speed operation; and

a ~~second switching circuit including a~~ second switching element suitable for a low-speed operation, ~~and where the first and second switching circuits receives-receive the~~ control pulse signal in parallel,

~~the switching circuit includes~~

a ~~first-third~~ switching circuit that receives a detection signal for discharge start in the inter-electrode portion ~~and comprises one of the first switching element suitable for the high-speed operation and the second switching element suitable for the low-speed operation;~~ and

a ~~second-fourth~~ switching circuit that receives a control pulse signal of a predetermined pulse width generated in response to the discharge start ~~and comprises the second switching element suitable for the low-speed operation;~~

~~the first switching circuit includes either of the switching element suitable for the high-speed operation and the switching element suitable for the low-speed operation; and~~

~~the second switching circuit includes the switching element suitable for the low-speed operation.~~

23. (currently amended): The power supply device for electric discharge machining according to claim 22, wherein when the ~~first-third~~ switching circuit ~~includes~~ comprises the first switching element suitable for the high-speed operation, the detection signal for starting the discharge is directly applied to a control terminal of the first switching element suitable for the high-speed operation.

24. (currently amended): The power supply device for electric discharge machining according to claim 22, wherein the ~~first-third~~ switching circuit ~~includes~~ comprises:

a plurality of drive circuits that receives the detection signal for starting the discharge, and generates a drive pulse signal of a different pulse width; and

a selection circuit that selects a drive pulse signal from ~~any one~~ of the drive circuits, and applies the selected drive pulse signal ~~selected to~~ a control terminal of ~~the~~ a respective switching element based on an instruction ~~from outside~~.

25. (currently amended): The power supply device for electric discharge machining according to claim 22, further comprising a ~~pulse-width~~ pulse-width setting unit that performs setting for changing a pulse width of the control pulse signal before starting the discharge ~~from outside~~.

26. (currently amended): A power supply device for electric discharge machining comprising:

a first pulse-width control unit and a second pulse-width control unit that generate a control pulse signal of a first pulse width and a control pulse signal of a second pulse width, respectively, in response to starting of a discharge in an inter-electrode portion that is a portion between an electrode and a workpiece serving as another electrode arranged to be opposed to the electrode at a predetermined interval;

a first switching circuit that receives the control pulse signal of the first pulse width and supplies a discharge pulse current to the inter-electrode portion, the first switching circuit ~~including a first switching circuit that includes~~ comprises a first switching element suitable for a low-speed operation;

a second switching circuit that receives the control pulse signal of the second pulse width and supplies a discharge pulse current to the inter-electrode portion, the second switching circuit ~~including a second switching circuit that includes~~ comprises a second switching element suitable for a high-speed operation;

a discharge-state judging unit that judges a discharge state at a time of starting the discharge in the inter-electrode portion from among a normal discharge state, an immediate discharge state, and a short circuit state; and

a current-pulse selecting unit that issues an output instruction to the first pulse-width control unit when the discharge-state judging unit judges that the discharge state is the normal discharge state, and issues an output instruction to the second pulse-width control unit when the discharge-state judging unit judges that the discharge state is ~~either~~ one of the immediate discharge state and the short circuit state.

27. (currently amended): The power supply device for electric discharge machining according to claim 26, further comprising a ~~pulse-with-pulse-width~~ setting unit that performs setting for changing a pulse width of the control pulse signal before starting the discharge ~~from outside~~.

28. (currently amended): A power supply device for electric discharge machining comprising:

a first pulse-width control unit and a second pulse-width control unit that generate a control pulse signal of a first pulse width and a control pulse signal of a second pulse width, respectively, in response to starting of a discharge in an inter-electrode portion that is a portion between an electrode and a workpiece serving as another electrode arranged to be opposed to the electrode at a predetermined interval;

a first switching circuit that receives the control pulse signal of the first pulse width and supplies a discharge pulse current to the inter-electrode portion, the first switching circuit ~~including a first switching circuit that includes~~ comprises a first switching element suitable for a low-speed operation;

a second switching circuit that receives the control pulse signal of the second pulse width and supplies a discharge pulse current to the inter-electrode portion, the second switching circuit ~~including a second switching circuit that includes~~ comprises a second switching element suitable for a high-speed operation;

a discharge-state judging unit that judges a discharge state at a time of starting the discharge in the inter-electrode portion from among a normal discharge state, an immediate discharge state, and a short circuit state; and

a current-pulse stop unit that issues an output stop instruction to the first pulse-width control unit when the discharge-state judging unit judges that the discharge state is either one of the immediate discharge state and the short circuit state.

29. (currently amended): The power supply device for electric discharge machining according to claim 28, further comprising a pulse-width setting unit that performs setting for changing a pulse width of the control pulse signal before starting the discharge ~~from outside~~.